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Imaging Experiments of Ne-like X-ray Lasers

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Abstract - We discuss high resolution two-dimensional near-field images of the neon-like nickel and germanium x-ray laser obtained using the Asterix laser at the Max-Planck-Institute and the Nova laser at Lawrence Livermore National Laboratory. Our imaging diagnostic consisted of a concave multilayer mirror that imaged the output end of the x-ray laser line onto a backside illuminated x-ray CCD detector. A 25 μm thick wire positioned at the end of the target provided a spatial fiducial. With the Asterix iodine laser, a prepulse 5.23 ns before the main pulse, was used to irradiate slab targets. A great deal of structure was observed in the near field images, particularly in the J=0-1 emission. We observed a large difference in the spatial dependence of the J=0-1 and J=2-1 lines of germanium, with the J=2-1 emission peaking farther away from the original target surface. A larger prepulse moved the peak emission farther away from the target surface. For the Nova experiments we used a series of 100 ps pulses spaced 400 ps apart to illuminate a germanium target. We obtained high resolution images of both the J=0-1 and J=2-1 lines of Ge. These measurements are compared to hydrodynamic simulations coupled with atomic kinetics and including refraction effects.

Biography - Dr. Moreno has a B. S. in Physics from the University of Maryland and a Ph. D. in Plasma Physics from the Massachusetts Institute of Technology. In 1985 Dr. Moreno became a research scientist at the University of Maryland where he worked on ICF plasmas, x-ray lasers, numerical simulation and plasma diagnostics. In 1992 Dr. Moreno went to Lawrence Livermore National Laboratory where he is involved in x-ray laser development and applications to plasma diagnostics, the study of high density plasmas and plasma spectroscopy.

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